PRESTRESSED CONCRETE PANELS (8-21-00)

1.0 GENERAL

~~When specified on the plans, Precast Prestressed Concrete Panels shall be used to form the concrete deck slabs for prestressed concrete girder spans only. The prestressed concrete panels shall not be used for structural steel spans.~~ The prestressed concrete panels shall be subject to the requirements for prestressed concrete members as specified in Section 1078 of the Standard Specifications with the following exceptions and additions.

420-3(D)1

2.0 DESIGN

Design of prestressed panels shall be the responsibility of the Contractor and subject to review by the Engineer. Prior to using prestressed panels, the Contractor shall submit seven sets, including one reproducible set, of detailed plans of the prestressed concrete panels for review. The checked plans shall be accompanied by one set of checked design calculations for the prestressed precast panels complying to the latest AASHTO Standard Specifications and requirements detailed herein and on the contract plans. The plans and design calculations shall be checked and sealed by a North Carolina Registered Professional Engineer. If corrections to the drawings are necessary, the Contractor shall submit one set of corrected reproducible drawings to the Engineer. The size of the sheets used shall be 22" x 34". The drawings shall become part of the contract plans.

420-3(D)1

The following criteria shall govern the design of prestressed concrete panels:

- ~~All cover of reinforcing shall be the same as detailed on the plans.~~
- ~~The distance measured from the top of the cast-in-place slab to the top of the prestressed concrete girder at the centerline of the girder bearing shall be maintained minimum as shown on the plans.~~

- The design compressive strength (f'_c) for the concrete in prestressed panels shall be 5000 psi minimum at 28 days. Compressive strength of concrete at time of release of strands shall be 4000 psi minimum.

PDP1 Std.

- The precast prestressed panel shall have a thickness of 3½ inches with the prestressed strands located at half the depth of the panel.
- For skewed spans, trapezoidal closure panels shall have a minimum width of 2 feet on the short side.

- Design details shall provide a mating surface joint or a draft may be used not exceeding 1/8 inch resulting in a joint that is closed at the top and a maximum of 1/4 inch open at bottom of panel. The joints shall be filled with grout or other methods approved by the Engineer to prevent leakage of the concrete. A chamfer or fillet shall be placed along the top edges of the panel parallel with the prestressed girder. This chamfer or fillet shall have a 3/4 inch horizontal width along the top of the panel.

420-3(D)1

420-3(D)1

- Panels shall be designed to support the dead load of the panel, reinforcement, plastic concrete and a 50 lbs/ft^2 construction load. The panel and slab acting compositely shall be designed to support design live loads and dead loads acting on the composite section. The design dead load acting on the composite section shall include an additional load of 20 lbs/ft^2 for a future asphalt wearing surface. Superimposed dead loads for such permanent bridge items as barrier rails, medians or any dead load which is applied after the deck is cast shall be distributed equally to all deck panels for bridges up to 44 feet in width, and in the case of bridges over 44 feet wide, the load shall be distributed equally to the first 2½ panels adjacent to each side of the load.

- All prestressing strands shall meet the requirements of AASHTO M203. All prestressing strands shall be 3/8" round, seven-wire stress relieved Grade 250 or 270.

1070-5

- Prestressing Force: 14,000 lbs per strand - Grade 250
  16,100 lbs per strand - Grade 270

1078-8

- All prestressing strands shall extend 2 inches beyond the panel edges.
- Shear reinforcing of 0.60 in^2 of reinforcing steel per 10 ft^2 of panel surface shall be provided in the panel to insure composite action between panel and the cast-in-place concrete. Shear reinforcement shall be made of welded wire having a minimum yield strength of 60 ksi.
- Shear reinforcement and lifting devices shall be constructed and placed so as to avoid any interference with reinforcing steel in the cast-in-place deck slab and to allow for proper concrete consolidation in the deck panel.

PDP1 Std.

- The design span of the prestressed concrete panel shall be the clear distance between edges of girders plus 2 in measured parallel to the panel edges.
- ~~Prestressed concrete panels shall not be considered as lateral bracing for flanges of supporting structural members.~~
- Tension in the precompressed tensile zone shall be limited to 424 psi unless the contract plans require 0 psi tension.

420-3(D)1

3.0 RAKED FINISH

The top surface of the prestressed concrete panels shall be given a raked finish or other approved finish to provide an adequate bond with the cast-in-place concrete. As soon as the condition of the concrete permits, the top surface of the concrete shall be raked making depressions of approximately 1/4 inch. Care shall be taken when raking not to catch and pull the coarse aggregate.

1078-14

4.0 ~~CURING PRESTRESSED CONCRETE PANEL MEMBERS~~

~~Any of the methods of curing specified in Section 1078 of the Standard Specification may be used, except the use of membrane curing compound will not be allowed~~.

5.0 DIMENSIONAL TOLERANCES

The prestressed concrete panels shall be manufactured within the tolerances listed below:

Length (Transverse direction to girders)		-1/4" to +1/2"
Width (Longitudinal direction to girders)		-1/8" to +1/4"
Depth		0 to +3/8"
Position of Strand	Vertical Dimension Horizontal Dimension	± 1/8" ± 1/2"

1078-15(E)

6.0 TRANSFER OF STRESS

Because of the critical nature of the bond development length in prestressed concrete panel construction, if the transfer of stress is by burning of the fully tensioned strands at the ends of the member, each strand shall first be burned at the ends of the bed and then at each end of each member before proceeding to the next strand in the burning pattern.

1078-11

7.0 PLACEMENT OF CONCRETE CAST-IN-PLACE SLAB

The top surface of the prestressed concrete panels shall be kept clean. A thorough inspection shall be made prior to placement of the concrete cast-in-place slab. Any foreign matter, oil, grease or other contaminants shall be cleaned off either with a high pressure water blast or sand blast. The top surface of the prestressed concrete panels shall be saturated by thoroughly wetting the top surface with water for a minimum of 2 hours before placing the cast-in-place concrete slab. The wetted panel surface shall not be allowed to dry before cast-in-place concrete slab placement. All puddles and ponds of water shall be removed from the surface of the panels and top of girder flanges before placing the cast-in-place concrete slab.

420-15(A)

8.0 REMOVAL OF FALSEWORK ON BENT DIAPHRAGMS

Falsework supports underneath bent diaphragms shall remain in place until after deck concrete has been cast and has reached a minimum compressive strength of 2400 psi in accordance with Article 420-17 of the Standard Specifications. If the Contractor wishes to remove form supports under bent diaphragms prior to casting deck concrete, he must submit to the Engineer for approval his proposed method of preventing the possibility of bent diaphragms from slipping downward.

420-17

9.0 DEFECTS AND BREAKAGE

1078-13

Prestressed concrete panels are weak in the direction perpendicular to the prestressing strands, therefore, they are subject to breakage during handling, storing or transporting. Adequate blocking must be provided during all of these construction phases. ~~Members that are improperly handled or otherwise damaged will be subject to rejection~~. ~~Manufacturing defects covered in the Standard Specifications will also be cause for rejection of the prestressed concrete panels.~~

10.0 BASIS OF PAYMENT

No separate payment will be made for prestressed concrete panels, but the entire cost of furnishing and installing these panels in accordance with this Special Provision, the contract plans, and applicable parts of the Standard Specifications shall be included in the contract unit price bid per square foot for "Reinforced Concrete Deck Slab".

420-1, 420-21(E) & 420-22